

# THE EFFECTS OF MALARIA ON QUALITY OF LIFE IN SUB-SAHARAN AFRICA

D Gordon

*University of the Sciences in Philadelphia,  
600 South 43rd Street, Philadelphia, Pennsylvania, 19104-2744, USA.*

## Abstract

Malaria affects more than 300 million humans a year. A PubMed literature search using the MeSH phrases "quality of life" and "malaria" identified 28 articles. The conclusions from the study were that malaria affects quality of life through its impact on family and community income, through its effect on shortening the lives of children and family members, and through neurological side effects that affect a child's ability to learn and become self-sufficient.

**Gordon D. The Effects of Malaria on Quality of Life in Sub-Saharan Africa. *Med J Therapeut Africa*. 2007;1:53-5.**

Keywords: malaria quality of life poverty sub-Saharan Africa

## Introduction

In sub-Saharan Africa today the World Health Organization (WHO) estimates malaria affects more than 300 million humans a year and directly causes over 1 million deaths.(1) These figures could be 3 times higher, the uncertainty resulting from the difficulty of diagnosing and tracking the disease in areas with little public health infrastructure.(2)

Since the evolution of mosquitoes and man, malaria has been the scourge of tropical climates. Malaria is declining in many other parts of the world, but increasing in Africa because of disease resistance, global warming, and the lack of any sustained effort to address the disease throughout the continent.(3)

The impact of malaria in sub-Saharan Africa extends beyond epidemiological estimates of morbidity and mortality. It also has a tremendous impact on the quality of life of all residents of the region through its effects on economic growth, family dynamics, cognitive development in children, and high death rates in children.

The aim of this paper was to bring together studies on the effects malaria has on the quality of life of humans affected by it, and by their communities, and to answer the question: What is the impact of malaria on the quality of life of a human and on the community?

## Methods

I searched PubMed, Lexis Nexis, and databases containing text from major newspapers including the Wall Street Journal and The New York Times using the MeSH phrases "quality of life" and "malaria," the

WHO site at who.int, plus a Google search.

## Results and Discussion

The WHO has on its web-site: "There is general agreement that poverty not only increases the risk of ill health and vulnerability of people, it also has serious implications for the delivery of effective health-care such as reduced demand for services, lack of continuity or compliance in medical treatment, and increased transmission of infectious diseases."(7) Living in poverty is associated with several indicators of health-related quality of life, including depression.(4-6)

Poverty impacts humans individually, as families lose work time to care for the ill, sending themselves deeper into poverty. It increases anxiety in family members and, when large numbers of adults cannot work, ultimately affects entire villages, towns, and countries.(7) Conversely, having a paid job significantly increases one's satisfaction with life, while a basic condition for improving the lives of parents is the opportunity for better employment.(8)

Strong evidence links poverty to malaria and malaria to poverty.(1) An analysis reported in 2001 by Gallup and Sachs found that countries with severe malaria in 1965 had growth 1.3% lower a year on average, taking into account initial income level, overall health, and tropical location. Overall, they estimate, malaria costs African nations \$12 billion a year.(9) African families may spend up to 25% of their annual income on malaria prevention and treatment.(10)

In 2006, the Nigerian chief malariologist attributed the loss of national income of approximately N132 billion (US \$1 billion) annually to the disease. He blamed it for high absenteeism in school and work, and noted that it "causes great misery to sufferers and adversely affects the social and psychological well-being of individuals, families, communities, and the nation as a whole.(11)

In nearly every country or region in which malaria is eradicated, significant growth is observed. An example is the United States in the 1940s. Before World War II, malaria afflicted over 100,000 humans each year in the southern states, and killed thousands. After drainage and insecticide spraying during the Depression and after the discovery of DDT, disease incidence was nearly eliminated. Throughout the 1950s the southern states grew from a per capita income of 60% of the rest of the United States to

69% by 1960.(9)

Another example is the Zambian copper belt in northern Rhodesia between 1930 and 1950. European companies developing copper mines were faced with 2 problems: malaria and the need for workers. They improved sanitation, housing and water, and prevented infection with mosquito nets and prophylactic quinine. Consequently, the mines were able to recruit all the workers they needed.(12) Companies drained swamps, poured oil on standing bodies of water, and sprayed with DDT and pesticides when available.

The results included substantial in-migration while the total population at the 4 mining sites studied increased 80% between 1940 and 1950. Rhodesian contribution to the world's copper supply grew from about 0.3% in the late 1920s to over 11% by 1940, and it became the third most important copper ore producer in the world.(12)

The efforts to eradicate malaria in Northern Rhodesia were estimated to save \$8.29 million in costs related to lost work time.(12) The additional working days translated into improved economic conditions for workers and their service providers, improving for all the overall quality of life. Calculations indicated that malaria control led to increased copper mining revenues, and increased taxable income in Zambia; without this control the percentage of national income derived from copper mining would have been 37% lower.(12)

Other indications of the program's effect on quality of life stemmed from the increase in length of employment and the growth in the number of married couples in the regions as men felt secure and safe enough to bring their wives and children to live with them. Having such a healthy labor force at that time contributed to social and economic development.(12)

Today, mining still significantly contributes to Zambia's economy. In 2004, the government nationalized the mines, which were in poor shape due to the collapse of worldwide copper prices. Since then mine production has increased and has the potential to significantly improve the country's overall economic status.(13)

### **SICKLE CELL DISEASE AND QUALITY OF LIFE**

In tropical regions of the world where malaria is endemic, humans are most likely to also be heterozygous for the sickle-cell trait.(14)

Homozygosity leads to sickle cell disease and a painful, shortened life. Improved medical care has led to a median survival in North America, Europe and the Caribbean of between 45 and 55 years.(14,15) No mortality figures are available for Africa, where median survival is estimated at about 5 years.(14) Humans so afflicted and their parents have reduced quality of life.(16,17) (See EC Pierce,

Med J Ther Africa 2007;1:31-32; 62-62.)

### **IMPACT OF MALARIA ON CHILDREN'S LEARNING ABILITY**

Children in sub-Saharan Africa are those most afflicted by malaria, where it contributes to an estimated 1 in 5 of all deaths of children.(18) WHO data shows that these children are particularly susceptible to cerebral malaria, which afflicts an estimated 0.61% of them under 5, and 0.26% from children 5 to 9 years of age, and kills 0.017% overall. Nearly 10% of surviving children have neurological problems, including blindness, severe cerebral palsy, deafness, ataxia, speech problems, cognitive impairment, epilepsy, hemiplegia, and hemiparesis. Although most symptoms disappear within 6 months, they are permanent in approximately 25% of surviving children.(19)

The cognitive deficits affect children during an important growth phase of the brain, when areas involved in higher-level learnings, such as planning, decision-making, self-awareness, and social sensitivity mature. These deficits also occur during the early education years, when children learn to read and figure. They also have significant effects on families, impacting the child's ability to contribute physically to the family and putting additional strain on parents who must care for a significantly disabled child (and, later, adult).(20)

Unrecognized neurological deficits impact a child's overall ability to learn and function. In a study of cerebral malaria survivors, 87 were assessed 3 to 4 years after discharge from hospital. The IQs of 14% of the survivors were more than 2 standard deviations from the control mean IQ. Similarly low IQs were measured in 5% of children who had never been diagnosed with cerebral malaria.(21) In Nigeria, a study resulted in the calculation that 2% of children surviving cerebral malaria had learning problems and disabilities.(11)

### **OTHER MALARIAL COMPLICATIONS**

Repeated malarial infections plus starvation and malnutrition cause severe anemia in children, and an estimated 190,000 to 974,000 deaths a year in children under 5 years.(18,19) Malarial anemia may lead to cognitive, learning and behavior deficits.(20) The unavailability of equipment for blood transfusions and the fact that HIV is carried in blood often eliminates blood transfusion as treatment.(22) Children may also have respiratory and metabolic symptoms including hypoglycemia, pulmonary edema, and malaria hyperpneic syndrome.(23)

In sub-Saharan Africa, a WHO study estimates that 12% of low birthweight babies are delivered to malaria-infected pregnant women.(24) The mortality rate of these newborns is estimated at 0.78 to 4.52% of live births.(25) Quality of life is poor in these babies into adulthood because of cognitive, mobility, self-care, and sensation limitations.(26,27) These studies of quality of life were reported from

the United States, where children spent time in neonatal care facilities. Consequently, the quality of life for babies born in Africa who survive past their first year is likely to be worse because of more limited access to appropriate medical care.

## Conclusions

Malaria wreaks economic and social havoc on the nations of sub-Saharan Africa. The economic cost is great, as is the cost to the quality of life.

## References

1. World Health Organization. Malaria in Africa. At [www.rbm.who.int/cmc\\_upload/0/000/015/370/RBM\\_Infoshet\\_3.htm](http://www.rbm.who.int/cmc_upload/0/000/015/370/RBM_Infoshet_3.htm). Accessed 24 Nov 2006.
2. Phillips RS. Current status of malaria and potential for control. *Clin Microbiol Rev.* 2001;14:208-26.
3. Greenwood B, Mutabingwa T. Malaria in 2002. *Nature.* 2002;415:670-72.
4. Casey PH, Szeto KL, Robbins JM, Stuff JE, Connell C, Gossett JM, Simpson PM. Child health-related quality of life and household food security. *Arch Pediatr Adolesc Med.* 2005;159:51-6.
5. Drukker M, van Os J. Mediators of neighbourhood socioeconomic deprivation and quality of life. *Soc Psychiatry Psychiatr Epidemiol.* 2003;38:698-706.
6. Hastings J, Taylor S, Austin MJ. The status of low-income families in the post-welfare reform environment: mapping the relationships between poverty and family. *J Health Soc Policy.* 2005;21:33-63.
7. World Health Organization. WHO / AFRO Division: Healthy Environments in Sustainable Development Area of Work. Priority 1: Poverty and Ill Health. At [www.afro.who.int/pih/pub/positionpaper.pdf](http://www.afro.who.int/pih/pub/positionpaper.pdf). Accessed 28 Nov 2006.
8. Schoon I, Hansson L, Salmela-Aro K. Combining Work and Family Life: Life Satisfaction Among Married and Divorced Men and Women in Estonia, Finland, and the UK. *Euro Psych.* 2005;10:309-19.
9. Gallup JL, Sachs JD. The economic burden of malaria. *Am J Trop Med Hyg.* 2001;64:85-96.
10. The Abuja Declaration and the Plan of Action. At [www.rbm.who.int/docs/abuja\\_declaration\\_final.htm](http://www.rbm.who.int/docs/abuja_declaration_final.htm). Accessed 28 Nov 2006.
11. Haruna G. How malaria underdevelops sub-saharan Africa. *Global News Wire* on 06 Oct 2006.
12. Utzinger J, Tozan Y, Doumani F, Singer BH. The economic payoffs of integrated malaria control in the Zambian copperbelt between 1930 and 1950. *Trop Med Int Health.* 2002;7:657-77.
13. Central Intelligence Agency. CIA factbook: Zambia. At [www.cia.gov/cia/publications/factbook/geos/za.html#Econ](http://www.cia.gov/cia/publications/factbook/geos/za.html#Econ)). Accessed 28 Nov 2006.
14. Serjeant GR. Mortality from sickle cell disease in Africa. *BMJ.* 2005;330:432-3.
15. Platt OS, Brambilla DJ, Rosse WF, Milner PF, Castro O, Steinberg MH, et al. Mortality In Sickle Cell Disease -- Life Expectancy and Risk Factors for Early Death. *N Engl J Med.* 1994;330:1639-44.
16. Edwards CL, Scales MT, Loughlin C, Bennett GG, Harris-Peterson S, De Castro LM, et al. A brief review of the pathophysiology, associated pain, and psychosocial issues in sickle cell disease. *Int J Behav Med.* 2005;12:171-9.
17. McClish DK, Penberthy LT, Bovbjerg VE, Roberts JD, Aisiku IP, Levenson JL, et al. Health related quality of life in sickle cell patients: the PiSCES project. *Health Qual Life Outcomes.* 2005;3:50.
18. World Health Organization. Children and Malaria. At [www.rbm.who.int/cmc\\_upload/0/000/015/367/RBM\\_Infoshet\\_6.pdf](http://www.rbm.who.int/cmc_upload/0/000/015/367/RBM_Infoshet_6.pdf). Accessed 27 Nov 2006.
19. Murphy SC, Breman JG. Gaps in the childhood malaria burden in Africa: cerebral malaria, neurological sequelae, anemia, respiratory distress, hypoglycemia, and complications of pregnancy. *Am J Trop Med Hyg.* 2001;64(1-2 Suppl):57-67.
20. Holding PA, Snow RW. Impact of Plasmodium falciparum malaria on performance and learning: review of the evidence. *Am J Trop Med Hyg.* 2001;64:68-75.
21. Holding PA, Kitsao-Wekulo PK. Describing the burden of malaria on child development: What should we be measuring and how should we be measuring it? *Am J Trop Med Hyg.* 2004;71(2\_suppl):71-9.
22. Ekvall H. Malaria and anemia. *Curr Opin Hematol.* 2003;10:108-14.
23. Newton CR, Taylor TE, Whitten RO. Pathophysiology of fatal falciparum malaria in African children. *Am J Trop Med Hyg.* 1998;58:673-683.
24. Kramer MS. Determinants of low birth weight: methodological assessment and meta-analysis. *Bull World Health Organ.* 1987;65:663-737.
25. McGregor IA, Wilson ME, Billewicz WZ. Malaria infection of the placenta in The Gambia, West Africa; its incidence and relationship to stillbirth, birth-weight and placental weight. *Trans R Soc Trop Med Hyg.* 1983;77:232-44.
26. Chien LY, Chou YH, Ko YL, Lee CF. Health-related quality of life among 3-4-year-old children born with very low birthweight. *J Adv Nurs.* 2006;56:9-16.
27. Saigal S, Stoskopf B, Pinelli J, Streiner D, Hoult L, Paneth N, et al. Self-perceived health-related quality of life of former extremely low birth weight infants at young adulthood. *Pediatrics.* 2006;118:1140-8.